

Supplementary Material*

Chou R, Dana T, Jungbauer R, et al. Update alert 4: masks for prevention of respiratory virus infections, including SARS-CoV-2, in health care and community settings. Ann Intern Med. 29 December 2020. [Epub ahead of print]. doi:10.7326/L20-1429

Supplement Table 1. Study Characteristics of Observational Studies of Mask Use – Update Alert #4

Supplement Table 2. Quality Assessment of New Randomized Controlled Trials of Mask Use – Update Alert #4

Supplement Table 3. Quality Assessment of New Observational Studies of Mask Use – Update Alert #4

Supplement Table 4. Mask Use and Risk for SARS-CoV-2 Infection – Update Alert #4

Supplement Table 5. Masks for Prevention of Respiratory Virus Infections Evidence Map – Update Alert #4

References

*This supplementary material was provided by the authors to give readers further details on their article. The material was reviewed but not copyedited.

Supplement Table 1. Study Characteristics of Observational Studies of Mask Use – Update Alert #4

Author, year Country Study design	Inclusion criteria	Sample size	Age	Female (%)	Definition of infection
Community setting					
Bundgaard et al 2020 (2) Denmark RCT	Community-dwelling, asymptomatic adults who reported being outside the home among others for at least 3 hours per day and who did not wear masks during their daily work	6,024	Mean 47 years	64%	SARS-CoV-2 infection (PCR), seropositivity or healthcare diagnosis of SARS-CoV-2 or COVID-19
Healthcare setting					
Akinbami et al 2020 (3) United States Cohort	Asymptomatic healthcare workers, first responders and public safety personnel	16,397 (86% healthcare worker)	Mean 42 years	69%	SARS-CoV-2 seropositivity
Sims et al 2020 (4) United States Cohort	Asymptomatic healthcare workers	20,614	Mean 43 years	77%	SARS-CoV-2 seropositivity

Abbreviations: PCR = polymerase chain reaction; RCT = randomized controlled trial; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2

Supplement Table 2. Quality Assessment of New Randomized Controlled Trials of Mask Use – Update Alert #4

Author, year	Randomization	Allocation concealment	Baseline groups comparable	Blinding of study participants	Blinding of outcomes assessment	Attrition and missing data reported	Intention-to-treat analysis	Analysis for adherence	Quality rating
<i>Community setting</i>									
Bundgaard et al 2020 (2)	Yes	Yes	Yes	No (unblinded study design)	No (unblinded study design)	Yes	Yes	Yes	Good

Supplement Table 3. Quality Assessment of New Observational Studies of Mask Use – Update Alert #4

Author, year Country	Did the study attempt to enroll all (or a random sample of) patients meeting inclusion criteria (inception cohort)?	Did the study use accurate methods for ascertaining exposures and potential confounders?	Were outcome assessors and/or data analysts blinded to exposure being studied?	Did the article report attrition or missing data?	Is there high attrition or missing data?	Were outcomes pre-specified and defined, and ascertained using accurate methods?	Other sources of potential bias	Quality rating
<i>Healthcare setting</i>								
Akinbami et al 2020 (3)	Yes	No (potential recall bias)	Unclear	No	Unclear	Yes	No control for confounders	Fair
Sims et al 2020 (4)	Yes	No (potential recall bias)	Unclear	No	Unclear	Yes	48% participation rate; limited control for confounders	Fair

Supplement Table 4. Mask Use and Risk for SARS-CoV-2 Infection – Update Alert #4

Author, Year (Reference)	Mask Use Versus Nonuse	Comparison of Mask Types	Consistency of Mask Use	Multiple Mask Layers Versus Single Layer
<i>Community setting</i>				
Bundgaard et al 2020 (2)	Surgical mask vs. no mask: OR 0.82 (95% CI 0.52 to 1.23)	--	--	--
<i>Healthcare setting</i>				
Akinbami et al 2020 (3)	--	--	Wearing an N95 mask all the time vs. less than all the time: <i>adjusted OR 0.83 (95% CI 0.72 to 0.95)</i> Wearing a surgical mask all the time vs. less than all the time: <i>adjusted OR 0.86 (95% CI 0.75 to 0.98)</i>	--
Sims et al 2020 (4)	Any mask vs. no mask: <i>OR 0.58 (0.50-0.66)*</i> N95 or surgical mask vs. no mask: <i>OR 0.57 (0.50-0.66)*</i> N95 vs. no mask: <i>OR 0.54 (0.47-0.62)*</i> Surgical mask vs. no mask: <i>OR 0.71 (0.58-0.86)*</i>	N95 vs. surgical mask: <i>OR 0.76 (0.63-0.92)*</i>	--	--

*Unadjusted OR calculated based on available data

Supplement Table 5. Masks for Prevention of Respiratory Virus Infections Evidence Map – Update Alert #4

Comparison (intervention A vs. intervention B)	SARS-CoV-2 infection	SARS-CoV-1 or MERS-CoV infection †	Influenza, influenzalike illness, and other viral respiratory illness (excluding pandemic coronaviruses) ‡
Community setting			
Mask (type not specified) vs. no mask in households with an index case and other community settings • SARS-CoV-2: 1 RCT (2) and 2 observational studies (5, 6) • SARS-CoV-1/MERS-CoV: 3 observational studies (10-12)	◆	◆	-
N95§ vs. surgical mask in household contacts • SARS-CoV-2: no studies • SARS-CoV-1/MERS-CoV: no studies • Influenza, influenzalike illness or other viral respiratory illness: 1 RCT (13)	-	-	◆
N95§ vs. no mask in household contacts • SARS-CoV-2: no studies • SARS-CoV-1/MERS-CoV: no studies • Influenza, influenzalike illness or other viral respiratory illness: 1 RCT (13)	-	-	◆
Surgical mask vs. no mask in households with an index case and other community settings • SARS-CoV-2*: 1 RCT (2) and 1 observational study (6) • SARS-CoV-1/MERS-CoV: no studies • Influenza, influenzalike illness or other viral respiratory illness: 12 RCTs (13-23)	◆	-	●
Cloth mask vs. no mask in community contacts • SARS-CoV-2: 1 observational study (6) • SARS-CoV-1/MERS-CoV: no studies • Influenza, influenzalike illness or other viral respiratory illness: no studies	■	-	-
Healthcare setting – moderate or higher risk (inpatient)			
Any mask vs. no mask • SARS-CoV-2*: 2 observational studies (4, 7) • SARS-CoV-1/MERS-CoV: 12 observational studies (24-35) • Influenza, influenzalike illness or other viral respiratory illness: no studies	■	●	-
N95 vs. no mask	■	◆	-

Comparison (intervention A vs. intervention B)	SARS-CoV-2 infection	SARS-CoV-1 or MERS-CoV infection †	Influenza, influenzalike illness, and other viral respiratory illness (excluding pandemic coronaviruses) ‡
<ul style="list-style-type: none"> • SARS-CoV-2*: 2 observational studies (4, 36) • SARS-CoV-1/MERS-CoV: 4 observational studies (24, 30-32) • Influenza, influenzalike illness or other viral respiratory illness: no studies 			
Surgical mask vs. no mask	■	■	-
<ul style="list-style-type: none"> • SARS-CoV-2*: k=2 observational studies (4, 9) • SARS-CoV-1/MERS-CoV: k=6 observational studies (24, 25, 27, 30, 31, 34) • Influenza, influenzalike illness or other viral respiratory illness: no studies 			
N95 or surgical mask vs. no mask	■	■	-
<ul style="list-style-type: none"> • SARS-CoV-2*: k=1 observational study (4) • SARS-CoV-1/MERS/CoV: k=1 observational study (35) • Influenza, influenzalike illness or other viral respiratory illness: no studies 			
Mask (type not specified) vs. no mask	-	◆	-
<ul style="list-style-type: none"> • SARS-CoV-2: no studies • SARS-CoV-1/MERS-CoV: k=5 observational studies (26, 28, 31, 33, 34) • Influenza, influenzalike illness or other viral respiratory illness: no studies 			
Cloth mask vs. no mask	-	■	-
<ul style="list-style-type: none"> • SARS-CoV-2: no studies • SARS-CoV-1/MERS-CoV: k=3 observational studies (24, 29, 34) • Influenza, influenzalike illness or other viral respiratory illness: no studies 			
Consistent/always mask use vs. inconsistent mask use	■	◆	-
<ul style="list-style-type: none"> • SARS-CoV-2*: k=1 observational study (3) • SARS-CoV-1/MERS-CoV: k=4 observational studies (25, 28, 37, 38) • Influenza, influenzalike illness or other viral respiratory illness: no studies 			
N95 vs. surgical mask (k=3 RCTs and 7 observational studies)	■	◆	●
<ul style="list-style-type: none"> • SARS-CoV-2*: k=2 observational studies (4, 8) 			

Comparison (intervention A vs. intervention B)	SARS-CoV-2 infection	SARS-CoV-1 or MERS-CoV infection †	Influenza, influenzalike illness, and other viral respiratory illness (excluding pandemic coronaviruses) ‡
<ul style="list-style-type: none"> • SARS-CoV-1/MERS-CoV: k=5 observational studies (24, 25, 30, 35, 39) • Influenza, influenzalike illness or other viral respiratory illness: k=3 RCTs (40-42) 			
N95 or surgical mask vs. cloth mask		■	-
<ul style="list-style-type: none"> • SARS-CoV-2: no studies • SARS-CoV-1/MERS-CoV: k=3 observational studies (24, 26, 34) • Influenza, influenzalike illness or other viral respiratory illness: no studies 	-	-	-
Surgical mask vs. cloth mask		-	◆
<ul style="list-style-type: none"> • SARS-CoV-2: no studies • SARS-CoV-1/MERS-CoV: no studies • Influenza, influenzalike illness or other viral respiratory illness: k=1 RCT (43) 	-	-	-
Healthcare setting – lower risk (outpatient)			
N95 vs. surgical mask			●
<ul style="list-style-type: none"> • SARS-CoV-2: no studies • SARS-CoV-1/MERS-CoV: no studies • Influenza, influenzalike illness or other viral respiratory illness: k=1 RCT (44) 	-	-	-

* New evidence added for Update Alert #4

† Only observational evidence was included for these infections

‡ Only RCT evidence was included for these infections

§ N95 or equivalent (e.g. P2 mask)

Strength of evidence

- Moderate
- ◆ Low
- Insufficient
- No evidence

Direction of effect

- | | |
|--|--|
| | Favors intervention A |
| | Effects similar or no difference |
| | No or too little evidence to determine |

References

1. Chou R, Dana T, Jungbauer R, et al. Masks for prevention of respiratory virus infections, including SARS-CoV-2, in health care and community settings: a living rapid review. *Ann Intern Med.* 2020;173(7):542-55. Epub 2020/06/25. doi: 10.7326/m20-3213. PubMed PMID: 32579379; PubMed Central PMCID: PMC7322812.
2. Bundgaard H, Bundgaard JS, Raaschou-Pedersen DET, et al. Effectiveness of adding a mask recommendation to other public health measures to prevent SARS-CoV-2 infection in Danish mask wearers. *Ann Intern Med.* 2020. doi: 10.7326/M20-6817.
3. Akinbami LJ, Vuong N, Petersen LR, et al. SARS-CoV-2 Seroprevalence among healthcare, first response, and public safety personnel, Detroit Metropolitan Area, Michigan, USA, May-June 2020. *Emerg Infect Dis.* 2020;26(12). Epub 2020/09/22. doi: 10.3201/eid2612.203764. PubMed PMID: 32956614.
4. Sims MD, Maine GN, Childers KL, et al. COVID-19 seropositivity and asymptomatic rates in healthcare workers are associated with job function and masking. *Clin Infect Dis.* 2020. Epub 2020/11/06. doi: 10.1093/cid/ciaa1684. PubMed PMID: 33150375.
5. Wang Y, Tian H, Zhang L, et al. Reduction of secondary transmission of SARS-CoV-2 in households by face mask use, disinfection and social distancing: a cohort study in Beijing, China. *BMJ Glob Health.* 2020;5(5). Epub 2020/05/30. doi: 10.1136/bmjgh-2020-002794. PubMed PMID: 32467353.
6. Doung-Ngern P, Suphanchaimat R, Panjangampatthana A, et al. Case-control study of use of personal protective measures and risk for Severe Acute Respiratory Syndrome Coronavirus 2 Infection, Thailand. *Emerg Infect Dis.* 2020;26(11). Epub 2020/09/16. doi: 10.3201/eid2611.203003. PubMed PMID: 32931726.
7. Chatterjee P, Anand T, Singh KJ, et al. Healthcare workers & SARS-CoV-2 infection in India: A case-control investigation in the time of COVID-19. *Indian J Med Res.* 2020;151(5):459-67. Epub 2020/07/03. doi: 10.4103/ijmr.IJMR_2234_20. PubMed PMID: 32611916.
8. Piapan L, De Michieli P, Ronchese F, et al. COVID-19 outbreak in healthcare workers in Trieste hospitals (North-Eastern Italy). *J Hosp Infect.* 2020. Epub 2020/08/18. doi: 10.1016/j.jhin.2020.08.012. PubMed PMID: 32805309; PubMed Central PMCID: PMC7427613.
9. Khalil MM, Alam MM, Arefin MK, et al. Role of personal protective measures in prevention of covid-19 spread among physicians in Bangladesh: a multicenter cross-sectional comparative study. *SN Compr Clin Med.* 2020;1-7. Epub 2020/09/10. doi: 10.1007/s42399-020-00471-1. PubMed PMID: 32904377; PubMed Central PMCID: PMC7454131.
10. Lau JT, Lau M, Kim JH, et al. Probable secondary infections in households of SARS patients in Hong Kong. *Emerg Infect Dis.* 2004c;10(2):235-43. Epub 2004/03/20. doi: 10.3201/eid1002.030626. PubMed PMID: 15030689; PubMed Central PMCID: PMC3322902.
11. Tuan PA, Horby P, Dinh PN, et al. SARS transmission in Vietnam outside of the health-care setting. *Epidemiol Infect.* 2007;135(3):392-401. Epub 2006/07/28. doi: 10.1017/s0950268806006996. PubMed PMID: 16870029; PubMed Central PMCID: PMC2870589.
12. Wu J, Xu F, Zhou W, et al. Risk factors for SARS among persons without known contact with SARS patients, Beijing, China. *Emerg Infect Dis.* 2004;10(2):210-6. doi: 10.3201/eid1002.030730. PubMed PMID: 15030685.

13. MacIntyre CR, Cauchemez S, Dwyer DE, et al. Face mask use and control of respiratory virus transmission in households. *Emerg Infect Dis.* 2009;15(2):233-41. Epub 2009/02/06. doi: 10.3201/eid1502.081167. PubMed PMID: 19193267; PubMed Central PMCID: PMC2662657.
14. Canini L, Andreoletti L, Ferrari P, et al. Surgical mask to prevent influenza transmission in households: a cluster randomized trial. *PLoS One.* 2010;5(11):e13998. Epub 2010/11/26. doi: 10.1371/journal.pone.0013998. PubMed PMID: 21103330; PubMed Central PMCID: PMC2984432.
15. Cowling BJ, Chan KH, Fang VJ, et al. Facemasks and hand hygiene to prevent influenza transmission in households: a cluster randomized trial. *Ann Intern Med.* 2009;151(7):437-46. Epub 2009/08/05. doi: 10.7326/0003-4819-151-7-200910060-00142. PubMed PMID: 19652172.
16. Cowling BJ, Fung RO, Cheng CK, et al. Preliminary findings of a randomized trial of non-pharmaceutical interventions to prevent influenza transmission in households. *PLoS One.* 2008;3(5):e2101. Epub 2008/05/08. doi: 10.1371/journal.pone.0002101. PubMed PMID: 18461182; PubMed Central PMCID: PMC2364646.
17. Larson EL, Ferng YH, Wong-McLoughlin J, et al. Impact of non-pharmaceutical interventions on URIs and influenza in crowded, urban households. *Public Health Rep.* 2010;125(2):178-91. Epub 2010/03/20. doi: 10.1177/003335491012500206. PubMed PMID: 20297744; PubMed Central PMCID: PMC2821845.
18. MacIntyre CR, Zhang Y, Chughtai AA, et al. Cluster randomised controlled trial to examine medical mask use as source control for people with respiratory illness. *BMJ Open.* 2016;6(12):e012330. Epub 2017/01/01. doi: 10.1136/bmjopen-2016-012330. PubMed PMID: 28039289; PubMed Central PMCID: PMC5223715.
19. Simmerman JM, Suntarattiwong P, Levy J, et al. Findings from a household randomized controlled trial of hand washing and face masks to reduce influenza transmission in Bangkok, Thailand. *Influenza Other Respir Viruses.* 2011;5(4):256-67. Epub 2011/06/10. doi: 10.1111/j.1750-2659.2011.00205.x. PubMed PMID: 21651736; PubMed Central PMCID: PMC4634545.
20. Suess T, Remschmidt C, Schink SB, et al. The role of facemasks and hand hygiene in the prevention of influenza transmission in households: results from a cluster randomised trial; Berlin, Germany, 2009-2011. *BMC Infect Dis.* 2012;12:26. Epub 2012/01/28. doi: 10.1186/1471-2334-12-26. PubMed PMID: 22280120; PubMed Central PMCID: PMC3285078.
21. Aiello AE, Murray GF, Perez V, et al. Mask use, hand hygiene, and seasonal influenza-like illness among young adults: a randomized intervention trial. *J Infect Dis.* 2010;201(4):491-8. Epub 2010/01/22. doi: 10.1086/650396. PubMed PMID: 20088690.
22. Aiello AE, Perez V, Coulborn RM, et al. Facemasks, hand hygiene, and influenza among young adults: a randomized intervention trial. *PLoS One.* 2012;7(1):e29744. Epub 2012/02/02. doi: 10.1371/journal.pone.0029744. PubMed PMID: 22295066; PubMed Central PMCID: PMC3266257.
23. Alfelali M, Haworth EA, Barasheed O, et al. Facemask versus no facemask in preventing viral respiratory infections during Hajj: a cluster randomised open label trial March 8, 2019. Available from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3349234.
24. Liu W, Tang F, Fang L-Q, et al. Risk factors for SARS infection among hospital healthcare workers in Beijing: a case control study. *Trop Med Int Health.* 2009;14(s1):S2-9. doi: 10.1111/j.1365-3156.2009.02255.x.

25. Loeb M, McGeer A, Henry B, et al. SARS among critical care nurses, Toronto. *Emerg Infect Dis.* 2004;10(2):251-5. Epub 2004/03/20. doi: 10.3201/eid1002.030838. PubMed PMID: 15030692; PubMed Central PMCID: PMC3322898.
26. Ma HJ, Wang HW, Fang LQ, et al. [A case-control study on the risk factors of severe acute respiratory syndromes among health care workers]. *Zhonghua Liu Xing Bing Xue Za Zhi.* 2004;25(9):741-4. Epub 2004/11/24. PubMed PMID: 15555351.
27. Nishiura H, Kuratsuji T, Quy T, et al. Rapid awareness and transmission of severe acute respiratory syndrome in Hanoi French Hospital, Vietnam. *Am J Trop Med Hyg.* 2005;73(1):17-25. Epub 2005/07/15. PubMed PMID: 16014825.
28. Nishiyama A, Wakasugi N, Kirikae T, et al. Risk factors for SARS infection within hospitals in Hanoi, Vietnam. *Jpn J Infect Dis.* 2008;61(5):388-90. Epub 2008/09/23. PubMed PMID: 18806349.
29. Pei LY, Gao ZC, Yang Z, et al. [Investigation of the influencing factors on severe acute respiratory syndrome among health care workers]. *Beijing Da Xue Xue Bao Yi Xue Ban.* 2006;38(3):271-5. Epub 2006/06/17. PubMed PMID: 16778970.
30. Raboud J, Shigayeva A, McGeer A, et al. Risk factors for SARS transmission from patients requiring intubation: a multicentre investigation in Toronto, Canada. *PLoS One.* 2010;5(5):e10717. Epub 2010/05/27. doi: 10.1371/journal.pone.0010717. PubMed PMID: 20502660; PubMed Central PMCID: PMC2873403.
31. Seto WH, Tsang D, Yung RW, et al. Effectiveness of precautions against droplets and contact in prevention of nosocomial transmission of severe acute respiratory syndrome (SARS). *Lancet.* 2003;361(9368):1519-20. Epub 2003/05/10. doi: 10.1016/s0140-6736(03)13168-6. PubMed PMID: 12737864; PubMed Central PMCID: PMC7112437.
32. Teleman MD, Boudville IC, Heng BH, et al. Factors associated with transmission of severe acute respiratory syndrome among health-care workers in Singapore. *Epidemiol Infect.* 2004;132(5):797-803. Epub 2004/10/12. doi: 10.1017/s0950268804002766. PubMed PMID: 15473141; PubMed Central PMCID: PMC2870165.
33. Wilder-Smith A, Teleman MD, Heng BH, et al. Asymptomatic SARS coronavirus infection among healthcare workers, Singapore. *Emerg Infect Dis.* 2005;11(7):1142-5. Epub 2005/07/19. doi: 10.3201/eid1107.041165. PubMed PMID: 16022801; PubMed Central PMCID: PMC3371799.
34. Yin WW, Gao LD, Lin WS, et al. [Effectiveness of personal protective measures in prevention of nosocomial transmission of severe acute respiratory syndrome]. *Zhonghua Liu Xing Bing Xue Za Zhi.* 2004;25(1):18-22. Epub 2004/04/06. PubMed PMID: 15061941.
35. Scales DC, Green K, Chan AK, et al. Illness in intensive care staff after brief exposure to severe acute respiratory syndrome. *Emerg Infect Dis.* 2003;9(10):1205-10. Epub 2003/11/12. doi: 10.3201/eid0910.030525. PubMed PMID: 14609453; PubMed Central PMCID: PMC3033076.
36. Wang X, Pan Z, Cheng Z. Association between 2019-nCoV transmission and N95 respirator use. *J Hosp Infect.* 2020(March 3). doi: 10.1016/j.jhin.2020.02.021.
37. Alraddadi BM, Al-Salmi HS, Jacobs-Slifka K, et al. Risk factors for Middle East respiratory syndrome coronavirus infection among healthcare personnel. *Emerg Infect Dis.* 2016;22(11):1915-20. Epub 2016/10/22. doi: 10.3201/eid2211.160920. PubMed PMID: 27767011; PubMed Central PMCID: PMC5088034.

38. Lau JTF, Fung KS, Wong TW, et al. SARS transmission among hospital workers in Hong Kong. *Emerg Infect Dis.* 2004;10(2):280-6. doi: 10.3201/eid1002.030534. PubMed PMID: 15030698.
39. Caputo KM, Byrck R, Chapman MG, et al. Intubation of SARS patients: infection and perspectives of healthcare workers. *Can J Anaesth.* 2006;53(2):122-9. Epub 2006/01/26. doi: 10.1007/bf03021815. PubMed PMID: 16434750.
40. Loeb M, Dafoe N, Mahony J, et al. Surgical mask vs N95 respirator for preventing influenza among health care workers: a randomized trial. *JAMA.* 2009;302(17):1865-71. Epub 2009/10/03. doi: 10.1001/JAMA.2009.1466. PubMed PMID: 19797474.
41. MacIntyre CR, Wang Q, Cauchemez S, et al. A cluster randomized clinical trial comparing fit-tested and non-fit-tested N95 respirators to medical masks to prevent respiratory virus infection in health care workers. *Influenza Other Respir Viruses.* 2011;5(3):170-9. Epub 2011/04/12. doi: 10.1111/j.1750-2659.2011.00198.x. PubMed PMID: 21477136; PubMed Central PMCID: PMC4941587.
42. MacIntyre CR, Wang Q, Seale H, et al. A randomized clinical trial of three options for N95 respirators and medical masks in health workers. *Am J Respir Crit Care Med.* 2013;187(9):960-6. Epub 2013/02/16. doi: 10.1164/rccm.201207-1164OC. PubMed PMID: 23413265.
43. MacIntyre CR, Seale H, Dung TC, et al. A cluster randomised trial of cloth masks compared with medical masks in healthcare workers. *BMJ Open.* 2015;5(4):e006577. Epub 2015/04/24. doi: 10.1136/bmjopen-2014-006577. PubMed PMID: 25903751; PubMed Central PMCID: PMC4420971.
44. Radonovich LJ, Jr., Simberkoff MS, Bessesen MT, et al. N95 Respirators vs medical masks for preventing influenza among health care personnel: a randomized clinical trial. *JAMA.* 2019;322(9):824-33. Epub 2019/09/04. doi: 10.1001/JAMA.2019.11645. PubMed PMID: 31479137; PubMed Central PMCID: PMC6724169